STATE OF IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

POLLUTANT TRADING GUIDANCE

November 2003 Draft

TABLE OF CONTENTS

IDAHO POLLUTANT TRADING GUIDANCE

I. INTRODUCTION

Pollutant trading is a business-like way of helping to solve water quality problems by focusing on cost effective, local solutions to problems caused by pollutant discharges to surface waters. Pollutant trading is voluntary. Parties trade only if both are better off as a result of the trade. Trading allows parties to decide how to best reduce pollutant loadings within the limits of certain requirements. The appeal of trading emerges when pollutant sources face substantially different pollutant reduction costs. Typically, a party facing relatively high pollutant reduction costs compensates another party to achieve an equivalent, though less costly, pollutant reduction.

Pollutant trading is recognized in Idaho's Water Quality Standards at IDAPA 58.01.02.054.06. Currently, the Department of Environmental Quality's policy is to allow for pollutant trading as a means to meet total maximum daily loads (TMDLs) thus restoring water quality limited water bodies to compliance with water quality standards. This Pollutant Trading Guidance document sets forth the procedures to be followed for pollutant trading.

II. TRADING COMPONENTS

The major components of pollutant trading are trading parties (buyers and sellers) and credits (the commodity being bought and sold). Additionally, ratios are used to ensure environmental equivlency of trades in a watershed. All trading activity must be recorded in the trading database through the Idaho Clean Water Cooperative.

Both point and nonpoint sources may create marketable credits. Credits are a reduction of a pollutant below a level set by a TMDL. Point sources create credits by reducing pollutant discharges below NPDES effluent limits which are set initially by the waste load allocation. Nonpoint sources create credits by implementing approved best management practices (BMPs) that reduce the amount of pollutant discharged. Nonpoint sources must follow specific design, maintenance, and monitoring requirements for that BMP, apply discounts to credits generated if required, and provide a water quality contribution to ensure a net environmental benefit. The water quality contribution also ensures the reduction (the marketable credit), is surplus to the reductions the TMDL assumes the nonpoint source is achieving to meet the water quality goals of the TMDL.

A. Parties

Both point and nonpoint sources are eligible to trade. Trading parties agree on the specific terms of a trade by entering into private contracts. The contracts identify the trading parties, pollutant reduction measures that will be undertaken, trade amount, effective date, trade duration (how long the trade is valid), responsibilities of each party, price and payment provisions, and remedies for failure to deliver credits. These contracts are private agreements and are not submitted to any agency or available for public review.

There are generally two different types of trades recognized for pollutant trading.

1. Point Source - Point Source Trading

A point source may voluntarily reduce its pollutant discharge below its effluent limit by a particular amount for a particular calendar month. This creates a credit that may be transferred to another point source. The transfer of credit reduces the seller's effluent limit in its NPDES permit by the amount of the credit. Credits are characterized by an amount of a pollutant per unit of time.

A point source is able to increase its effluent limit by receiving the transfer of a credit generated by another point source located within the same watershed. Credits can only be used in the same month in which the underlying reduction occurred.

Each point source is responsible for meeting its individual effluent limit, adjusted by traded credits. EPA retains full enforcement authority in the event either point source's adjusted effluent limit is exceeded.

Individual point sources may have provisions in their permits that limit their ability to increase their discharge to prevent adverse local water quality impacts.

2. Point Source - Nonpoint Source Trading

A nonpoint source may voluntarily reduce the amount of pollutant it discharges. If a Best Management Practice (BMP), selected from the applicable BMP List (see Appendices), is installed and the pollutant reduction is measured or calculated and documented according to the BMP's requirements, a credit can be created that may be transferred to a point source. A nonpoint source credit is characterized by an amount and a time period consistent with the TMDL and a point source's NPDES requirements. The amount of the credit is determined by applying the BMPs, adjusted by the ratios, minus the water quality contribution.

A point source may increase its effluent limit for any month, by receiving the transfer of a credit generated in the same month, by a nonpoint source located within the same watershed. When nonpoint source reductions are used to adjust point source effluent limits, the point source retains full responsibility for the quantity and delivery of the credits it purchases from a nonpoint source and uses to meet its limit.

Nonpoint source credits are transferable only after the project is installed, installation has been inspected by the point source, and the reductions have been verified through monitoring and recorded. Should EPA or DEQ later determine the credit's underlying reduction is invalid, the credit is nullified and the point source's effluent limit is adjusted accordingly. EPA has full authority under the NPDES program to enforce the point source's adjusted effluent limit. Mechanisms used to verify reductions include monitoring, trade information tracking (including use of a trade database), and record keeping and reporting. EPA and DEQ will verify nonpoint source reductions as set forth in part IV, Trading Reviews.

B. Credits

Both point sources and nonpoint sources may create marketable credits. Credits are reductions of a pollutant below a level set by a TMDL. As an example, if a TMDL requires a reduction from a specific source of a 100 pounds per day of a pollutant into a water body and the source reduces its pollutant amount by 110 pounds per day, 10 credits of pollutant have been created, although ratios may be required to convert the credit into a universal quantity . Credits can only be produced using the amount of pollutant reduced beyond a TMDL load requirement.

Point sources create credits by reducing pollutant discharges below NPDES effluent levels. Nonpoint sources create credits by implementing approved BMPs that reduce the amount of pollutant discharged.

Credits produced by nonpoint source practices are either measured or calculated.

1. Measured Credits

Any nonpoint source practice on the approved BMP List (see part V below) for that watershed whose pollutant reduction results can be measured directly, may be implemented to generate measured credits. Minimum design, construction and maintenance requirements (generally NRCS standards and specifications) and minimum monitoring requirements for measured credits are specified in the BMP List. If these specifications are followed, then the measured reduction is adjusted by applicable trading ratios and the water quality contribution to determine the amount of credit available for trading. These credits may then be acquired and used by a point source for compliance with its NPDES effluent limit. Trading parties are responsible for: inspections to ensure BMPs are installed according to plans and specifications: maintenance monitoring to ensure BMPs are maintained and repaired to continue their full functioning; and effectiveness monitoring to measure actual pollutant reductions. Trading parties must document the results of these monitoring activities to demonstrate that the nonpoint source is achieving the stated reduction, using monitoring methods specified in the BMP List.

2. Calculated Credits

Calculated nonpoint source credits are those for which the amount of marketable credits must be determined by a calculation because direct monitoring of reductions is technically infeasible or too costly. Calculated credits may only be created from practices on the BMP List for a designated watershed. The BMP List includes an equation for estimating pretreatment load, design and construction criteria, monitoring requirements, operation and maintenance requirements, the credit duration, and an uncertainty discount for a specific BMP. Generally, NRCS standards and specifications for nonpoint source practices are the minimum requirements for design, construction, operation, and maintenance.

The *uncertainty discount* is a multiplier that reduces the number of transferable credits generated by a calculated nonpoint source reduction, to account for variability in the effectiveness of the practice. Site conditions and seasonal variations in flow and load are examples of factors that produce variability in the effectiveness of a practice. The design, construction, operation, and maintenance requirements for each practice help reduce uncertainty and prolong the BMP's effectiveness.

Calculated credits must be monitored through inspections to ensure that the BMP is installed according to plans and specifications and to establish the start date for a nonpoint source credit. Monitoring also includes maintenance inspections to ensure the BMP is operated and maintained according to requirements. The trading parties must make any necessary adjustments to achieve the installed BMP's expected performance, and to document those adjustments as part of the BMP's record.

C. Watershed Specific Environmental Protection

Trades must be implemented so that the overall water quality of the watershed is protected. To do this, hydrologically-based ratios are developed to provide that trades between sources distributed throughout a watershed result in environmentally equivalent or better outcomes at the point of environmental concern. In addition, localized adverse impacts to water quality are not allowed.

1. Ratios

Ratios create a common unit for measuring increases and decreases at different locations in a watershed or along a water body. These common units become credits that can be bought and sold in a trade. Environmental equivalency is based on the relationship between the impact a given unit of a pollutant has at its point of discharge to the impact at the water body's point of concern. In relatively simple trades between an upstream seller and a downstream buyer, a ratio may be close to 1:1 if the pollutant is not diverted or diminished as it moves downstream. If, however, the pollutant is taken up through plants, settles out, is diverted by agricultural uses or is diminished in some other way, a buyer may have to purchase more credits than it actually needs at its discharge point to account for the actual reduction in the water body.

Ratios are specific to pollutants and water bodies and must be developed prior to a trade taking place. All ratios developed for pollutant trading must ensure that a seller's credits are functionally equivalent in water quality protection to a buyer's needs. In using ratios to determine the amount of credits available, only the amount of a pollutant reduced beyond a TMDL load requirement is to be used in the calculation. Ratios are listed by watershed in the Appendices.

Ratios will be reviewed at least every five years, usually in conjunction with the reissuance of NPDES permits for point sources. The reviews will be conducted by DEQ with the results provided to the Idaho Clean Water Cooperative for use in the trading database. Ratios will be revised if calculations for each of the five years since the last review show a divergence from the published ratios by 30% or more. The variation must be present in two consecutive years, indicating a trend and permanent change in the flow regime, to require a revision of the published ratio set.

2. Local Impacts

Pollutant trading has the potential to cause water quality impacts in the area where trading occurs. Ratios are designed to only address the net impact of a trade in relation to one defined location, such as the mouth of a water body. Ratios do not, however, address a trade's potential net impact at any other point in the watershed or along a water body.

The TMDLs for each water body will set base WLAs for point sources, which will be used to develop base effluent limits that will be incorporated into each NPDES permit. Since pollutant trading allows sources to discharge above their base effluent limits, adverse local water quality impacts could occur. NPDES permits may contain provisions that limit pollutant trading to ensure that discharges from permitted facilities do not cause or contribute to any water quality standards being exceeded. These provisions could include an upper limit on the amount a particular point source may discharge that overrides any credits the point source may hold in its account. The limit would be based on the watershed analysis of potential local impacts.

Prior to allowing any trading within the context of a permit, an analysis of the watershed must be completed to ensure that specific trades do not degrade water quality within the area of the trade. The effects of shifting pollutant loading to different points in the watershed and the interaction between a pollutant and other environmental factors must be taken into account in the analysis.

Localized impact strategies must be utilized to ensure that ambient water located between the buyer and the seller is not adversely impacted by the increase in load. A mechanism must be used to ensure that a trade does not cause or contribute to any water quality standards being exceeded. Any such mechanism must include an analysis of water quality conditions that support it. Monitoring will be conducted to verify that the limits on trading are supporting the maintenance of desired water quality.

The potential for localized impacts is least when the seller is upstream of the buyer. However, when there are diversions below the upstream source and above the downstream source, the full benefit of the upstream source's reduction may not be felt in the water body until some distance below the downstream source, when the irrigation return flows reenter the water body. This could result in net pollutant increases in the water body below the downstream source and above the return flow.

If the buyer is upstream of the seller, there would be an expected net increase in pollutant loadings in the stretch of the water body between the two sources. The localized impacts analysis must ensure that the ambient water located between the buyer and the seller is not adversely impacted by the increase in load.

If two sources are not both on the main stem of a water body or on the same tributary, then an additional factor must be considered as there will be a net increase in pollutant loading in the stretch immediately downstream of the buyer, before the tributary joins the main stem (or the two tributaries meet). Again, a mechanism must be used to ensure that a trade does not cause or contribute to any water quality standards being exceeded.

III. Reporting Requirements and Record Keeping

A. Forms and Reports

Trading parties must generate and maintain records to substantiate the validity of underlying reductions of credits, and document trades. In particular, point sources using credits from nonpoint source reductions must maintain monitoring records to verify the validity of nonpoint source credits used to adjust a base effluent limit. These records are to be made available to EPA and DEQ upon request. Trading parties must retain copies of trading records on site for a five year period after completion of a trade contract.

1. Trade Notification Forms

A *Trade Notification Form* (see Appendix A) is required for each trade. This document officially registers the trade, transfers credits from the seller to the buyer, and adjusts the pollutant limit(s), subject to credit verification for nonpoint source credits. The *Trade Notification Form* must be signed by both parties and submitted by the point source, or if two point sources are trading, by the buyer, to the ICWC. The ICWC will then enter the information into the trade tracking database. In signing the *Trade Notification Form*, the nonpoint seller allows the BMP site to be inspected by the regulatory authorities for the purpose of verifying compliance of the NPDES permit holder.

2. Reduction Credit Certificate

For trades involving nonpoint source credits, a *Reduction Credit Certificate* (see Appendix A) must also be submitted by the point source to document the nonpoint source reduction and "create" the credit. The established credits can then be transferred to and used by the point source. In signing the *Reduction Credit Certificate*, the point source certifies that the monitoring information is true, accurate and complete, that the BMP has been installed, maintained, and monitored as required in the BMP List, and that the credit is calculated as set forth in the BMP List.

If the point source purchases a credit established by a nonpoint source but initially sold to another party who signed the *Reduction Credit Certificate*, the point source using the credit must verify for itself that the credit, and the underlying reduction it represents, are valid. In signing the *Trade Notification Form*, the point source is certifying that it has done so.

3. Discharge Monitoring Reports

Point sources involved in a trade will use discharge monitoring reports (DMRs) to summarize monitoring results and report actual effluent discharges. If trading occurs, along with a DMR, a point source will report its actual average monthly effluent discharge, the amount of credits (in lbs/day) sold or bought, and its adjusted discharge (the actual discharge plus or minus any credits traded). DMRs must be submitted to EPA by the 20th day of the second month following the reporting month. This gives a point source time to complete sample analysis for any nonpoint source monitoring conducted near the end of the month and find replacement credits if its actual discharge exceeds the sum of its base effluent limit plus any purchase of credits it has entered into for that month minus any credits it sold for that month. A permit violation occurs when the amount of the point source's actual discharge exceeds the amount of its base limit plus the amount of purchased credits minus any credits sold.

4. Trade Summary Reports

A point source purchasing credits is responsible for submitting the *Trade Notification Form* (signed by seller and buyer) to the ICWC. For trades involving nonpoint sources, the point source must also submit the signed *Reduction Credit Certificate* to the ICWC. The ICWC will prepare and send a *Trade Summary Report* to the point source, and the point source must submit this report to EPA along with the DMR. The trade amounts shown on the DMRs must match the trade amounts shown on the Trade Summary reports.

B. Trade Database

The ICWC is responsible for trade tracking and the day to day management of trading. Major functions of the ICWC are:

- set a submittal time for trade notification forms and reduction credit certificates;
- accept and review trades to ensure completeness and consistency with trading program requirements, and not accept trades that do not meet program requirements;
- track all trades in a central database and show trades' impacts on effluent limits and account balances of buyers and sellers;
- reconcile all trades in the market area to ensure credits are not used more than once;
- make trading information and adjusted effluent limits readily available to regulatory agencies and the public; and
- produce Trade Summary Reports required for permit compliance and provide them to the point sources involved in trades.

By maintaining the trade tracking database, the ICWC ensures that an accounting of all trades and credits is available to the public and the environmental agencies. The database must be subject to sound data system and accounting principles with regular audits conducted by an outside group.

IV. Trade Reviews

A. Inspections of NPDES Permitted Facilities

Trades involving point sources are inspected by EPA and DEQ as part of the procedures for NPDES permits. DMRs will be reviewed and compared with trading information contained in the monthly Trade Summary Report with any anomalies being investigated by EPA and DEQ. Inspections of point source records may include review of documents related to a best mangement practice's performance of pollutant reduction.

B. Review of Best Management Practices (BMPs)

The Soil Conservation Commission (SCC) will conduct reviews of best mangement practices (BMPs) implemented by nonpoint sources according to the cost-share program requirements for any BMPs funded in part or in full by state-administered cost-share programs. Copies of the reports from these reviews of BMPs involved in trades will be provided, and additional site reviews conducted, when requested by EPA or DEQ for the purpose of verifying the reduction mechanism. In addition, EPA and DEQ may visit the BMP sites themselves, accompanied by the SCC, to verify the documentation of the BMP design, maintenance, and monitoring performance. NPDES permit holders remain responsible for ensuring the proper implementation of BMPs and the correct amount of credits produced. Any compliance matters or enforcement actions will be taken up with the NPDES permit holder only. A copy of the SCC inspection report will be provided to the permit holder who purchased credits from that specific BMP installation.

V. BEST MANAGEMENT PRACTICES (BMPS) LIST

A. Development

Nonpoint sources generate transferable water quality credits by implementing approved best management practices (BMPs). A list of approved BMPs, by watershed, can be found in the Appendices. This list sets out which BMPs can be used for trading, as well as each BMP's procedures for determining the amount of credits and its monitoring and maintenance requirements.

Practices are developed and added to the list by following the steps outlined below. Practices may be added to the BMP List at any time.

Step 1: Prepare and Submit Proposed BMP Package

New practices, practices already on the APAP list,[1] or improved design, measurement,or calculation methods to BMPs already on the BMP List may be nominated by anyone for inclusion on the BMP List. Each proposed BMP package must contain a description of the BMP and how it works; where the BMP should be applied (appropriate site conditions); potential side effects and ancillary benefits; monitoring requirements; design, installation, operation, and maintenance requirements; a method for calculating credits (for calculated credits only), including BMP efficiency and an uncertainty discount; and

[1] The Idaho Agriculture Pollution Abatement Plan is Idaho's response to Section 208 of the federal Clean Water Act (PL 92-500), detailing how agricultural nonpoint source pollution is to be managed. This includes a list of nonpoint source Best Management Practices that can be used in Idaho to achieve water quality benefits.

substantiating information. The proposed BMP package must be submitted to the state BMP Technical Committee administered by the SCC[2].

Step 2: Initial Screening of BMP Proposal

The Department of Environmental Quality will perform an initial screening of the package for completeness and forward complete packages to the BMP Technical Committee to review such packages.

Step 3: Review Process and Criteria for BMP Consideration

The BMP technical committee will review the package within ninety (90) days, or report how much more time is needed (and why) to the party submitting the BMP for review. If the proposed BMP is already included in the APAP, then the committee will only review the pollutant trading portion of the BMP package and related supporting documentation for its consideration on the BMP List. If the BMP is not included in APAP, then the technical committee can decide to postpone its review until it is incorporated in the APAP, or proceed to add it to the pollutant trading BMP List if it is acceptable. If the proposed BMP involves new technology or methods for which data and experience are insufficient to support a credit calculation, then the BMP will initially only be approved as a measured BMP, if the monitoring is scientifically credible and not cost prohibitive. If the practice's measurements are too variable based on type of crop planted or field size then it may only be allowed as a calculated credit.

Step 4: DEQ Concurrence, Public Notice and Comment

If the BMP technical committee recommends the BMP, it is forwarded to DEQ for concurrence. A public notice and comment period will be conducted by DEQ. Comments will be limited to the new BMP, and not to the program or the list of BMPs that have already been approved.

Step 5: Final Decision/Addition to BMP List

DEQ will revise the BMP based on public comments, in consultation with the BMP technical committee, and issue its final decision. If it is approved, the BMP will then be placed on the BMP List.

Revisions to BMPs that have already been approved will follow the same process as for adding a new BMP. BMP revisions may be triggered by the monitoring results or any other monitoring of the BMP's overall effectiveness and impact on

---

[2] Idaho Soil Conservation Commission, BMP Technical Committee, Pollutant Trading, P.O. Box 790, Boise, Idaho 83701.

other environmental parameters, as well as research of the BMP's performance on other sites.

B. Plans

Any agricultural pollutant reduction project that intends to generate marketable credits must first have a qualified professional[3] prepare a farm or project plan that will select and properly design appropriate BMPs to improve water quality at a specific location. The process for developing a plan will depend on whether the project is a farm-scale project or a watershed-scale project.

1. Farm-Scale Projects

All farm-scale agricultural BMP projects involving cost-share funds must develop a farm plan using the conservation planning process. Under this process, technicians from the NRCS or the SCC, in cooperation with the farmer, assess farm conditions and problems, identify appropriate BMPs, develop a farm plan including detailed BMP design, and identify possible funding sources to help implement the plan.

Farmers developing projects for pollutant trading who are not seeking cost-share funds are encouraged to use the conservation planning process, but also may choose to develop a private plan using a qualified professional. If a farmer elects to develop a private plan, the plan must meet the following requirements:

- be designed with the goal of improving water quality;
- meet all applicable laws and regulations (wetlands, stream channel alteration, etc); and
- cause no significant adverse impacts to water quality or other resources (i.e., cannot violate water quality standards).

Whether the plan addresses resource issues other than water quality is up to the farmer. A qualified professional needs to develop detailed plans and specifications for the BMP and inspect the BMP to ensure that it was properly installed.

2. Watershed-Scale Projects

Under the Idaho agriculture cost-share program, watershed-scale projects may be eligible for cost-share funds. All watershed-scale projects involving cost-

[3] A qualified professional could be any of the following: an NRCS certified planner or an NRCS employee, a certified crop advisor, or a professional engineer. Some BMPs, such as constructed wetlands, will require consultation with other experts as well. Some BMPs on the list may specify the type of expert that will need to be consulted in the project's design, installation, and maintenance requirements.

share funds must develop a project plan using the conservation planning process.

Parties developing watershed-scale projects for pollutant trading, who are not seeking cost-share funds, are encouraged to use the conservation planning process, but also may choose to develop a private plan using a qualified professional. If a party elects to develop a private plan, the plan must meet the same requirements as a private plan for a farm-scale project. In addition, a qualified professional must prepare detailed plans and specifications and inspect the installation. Watershed-scale project plans are likely to need a professional engineer /or consultation with other professionals for some types of BMPs (e.g., constructed wetlands).

Lower Boise River Watershed
– REDUCTION CREDIT CERTIFICATE –

VALID FOR REDUCTION ACTIVITY FOR MONTH(S) OF ____________________ YEAR _________

NAME OF NON-PERMITTED SOURCE:

CONTACT NAME:

ADDRESS:

PHONE NUMBER:

BEST MANAGEMENT PRACTICE (BMP) IDENTIFIER:

– Type of BMP:

– Location of BMP:

MONITORING METHOD:

MONITORING FREQUENCY:

MONITORING RESULTS (LOCAL POUNDS):

PARMA POUNDS (AMOUNT OF MARKETABLE CREDITS):

Total Reduction Amount in Local Pounds _________

Subtract **Water Quality Contribution*** amount __________ = __________
(*TMDL determines what this amount or calculation is)

multiply by **River Location Ratio** __________ = __________ (tradable credit amount in Parma Pounds if next two factors are not applicable)

(if applicable) *multiply by* **Drainage Delivery Ratio** __________ = __________ (tradable credit amount in Parma Pounds if next factor is not applicable)

(if applicable) *multiply by* **Site Location Factor** __________ = __________ (tradable credit amount in Parma Pounds)

CERTIFICATION:

This form has been prepared for the purpose of submitting the information contained in it to the U.S. Environmental Protection Agency.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I further certify that I am authorized to bind the party on behalf of which I am signing to the terms of this document. I further certify that the BMP, the monitoring, and the credit calculation described above satisfies the requirements for that type of BMP as set forth in the BMP list. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 U.S.C. § 1001 and 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

____ **DATE:** ________________________
SIGNATURE OF BUYER

Lower Boise River Watershed ***-TRADE NOTIFICATION FORM-***	***Date Received:______________________*** ***(To Be Completed by Idaho Clean Water Cooperative)***

– TO BE COMPLETED BY THE BUY R –
NAME OF BUYER (POTW OR COMPANY):
NPDES PERMIT NUMBER:
NAME OF BUYER'S AUTHORIZED REPRESENTATIVE:
PHONE NUMBER:
– TO BE COMPLETED BY THE SELLER –
NAME OF SELLER:
SELLER'S NPDES PERMIT NUMBER (IF APPLICABLE):
NAME OF SELLER'S AUTHORIZED REPRESENTATIVE:
PHONE NUMBER:
– TO BE COMPLETED BY EITHER PARTY –

AMOUNT OF PHOSPHOROUS TRADED (PARMA POUNDS): __________________ LBS./DAY FOR:

1) The month of_____________________ (if purchasing verified credits from a Non-Permitted Source, Provide BMP Identifier: __________________________) **OR**

2) _______________(month/year) to _______________(month/year), to create an automatic transfer from the Seller's account to the Buyer's account, upon the recording of a valid Reduction Credit Certificate for that amount in the trade tracking database by the 10th day of the second month following generation.

CERTIFICATION:

This form has been prepared for the purpose of submitting the information contained in it to the U.S. Environmental Protection Agency.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein; and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I further certify that I am authorized to bind the party on behalf of which I am signing to the terms of this document. I acknowledge that the transfer of credits specified in this document is contingent on the generation of the underlying credits, and my certification of those credits by a Reduction Credit Certificate corresponding to the BMP identified above and the applicable monitoring period. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. See 18 U.S.C. § 1001 and 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

I understand that the amount of credits to be transferred by this form is determined initially by the amount established in the first completed Reduction Credit Certificate that is received by the Idaho Clean Water Cooperative for the BMP identified for that month, and then by the amount specified by the Trade Notification Form, up to the amount of credits remaining in the actual BMP credit calculation. I understand that the order in which a Trade Notification Form is processed when multiple Trade Notification Forms are received that request to transfer credits from a single seller's account is determined by the order in which they were received for recording by the Idaho Clean Water Cooperative.

____ DATE:__________________________

SIGNATURE OF PERMITTED SOURCE BUYER*:*

FOR NON-PERMITTED SOURCE SELLER WHO OWNS OR IS THE LESSEE OF THE PROPERTY ON WHICH THE ABOVE REFERENCED BMP IS LOCATED:

I hereby transfer all or part of the credit from BMP Identifier ______________________, for the time period specified in this document, to the Buyer identified in this document. I hereby grant permission to access the BMP described above at reasonable times to the NPDES permit holder purchasing this credit and the Idaho Soil Conservation Commission for the exclusive purpose of verifying the information contained in this document and in any Reduction Credit Certificate pertaining to the BMP described above. All information collected or received during or pursuant to such access to the BMP shall be used solely for purposes of regulatory compliance of the NPDES permit holder and not for any other purpose whatsoever. Such access shall extend to the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency to the extent set forth in the Memorandum of Agreement, dated *xx/xx/xxxxx* . I understand that the amount of credits to be transferred by this form is determined initially by the amount established in the first completed Reduction Credit Certificate that is received by the Idaho Clean Water Cooperative for that BMP for that month, and then by the amount specified by the Trade Notification Form, up to the amount of credits remaining in the seller's account. I understand that the order in which a Trade Notification Form is processed when multiple Trade Notification Forms are received that request to transfer credits from a single seller's account is determined by the order in which they were received for recording by the Idaho Clean Water Cooperative.

____DATE: __________________________________

SIGNATURE OF SELLER

SELLER OF NONPOINT SOURCE REDUCTION BY OTHER THAN A POINT SOURCE OR THE NONPOINT SOURCE INVOLVED IN THE BMP:

I hereby transfer all or part of the credit from BMP Identifier ______________________, for the time period specified in this document, to the Buyer identified in this document. I understand that the amount of credits to be transferred by this form is determined initially by the amount established in the first completed Reduction Credit Certificate that is received by the Idaho Clean Water Cooperative for that BMP for that month, and then by the amount specified by theTrade Notification Form, up to the amount of credits remaining in the seller's account. I understand that the order in which a Trade Notification Form is processed when multiple Trade Notification Forms are received that request to transfer credits from a single seller's account is determined by the order in which they were received for recording by the Idaho Clean Water Cooperative.

____ DATE: ______________________

SIGNATURE OF SELLER

FOR PERMITTED SOURCE SELLER:

I hereby reduce the phosphorus discharge allowance under the TMDL and under NPDES Permit Number _______________________ by the amount identified in this document.

____DATE: _______________________

SIGNATURE OF SELLER

Only one applicable Seller's signature box will be used.

DRAFT
Lower Boise River Watershed
Best Management Practices List

Document Purpose

Selected nonpoint source BMPs can be used to generate transferable credits subject to requirements outlined in the Pollutant Trading Requirements document. This BMP List describes which BMPs can be used for trading, as well as each BMP's procedures for determining the amount of credits and its monitoring requirements.

Calculated and Measured Phosphorus Credits

To offset a given amount of phosphorus at one location from a point source, there must be an equal and beneficial reduction from another point or nonpoint source location. The term "credit" has been established to represent that equalized portion of phosphorus considered in the trading market. The reduction is calculated or measured in pounds of phosphorus, determined by one of two methods. These reductions are then converted to credits for trading purposes.

To estimate what a BMP's capability is in reducing phosphorus losses, local sampling data is needed in order to make that estimate. Where there is adequate data for a specific BMP's reduction capability, a calculation can be made with fair certainty of it actually occurring. Where data is limited, "measuring" for phosphorus removal is necessary. For pollutant trading, participants may use either the calculated or measured approach to generate credits. The calculated approach will utilize existing data to estimate an average reduction for a particular BMP, with a slight discount in its effectiveness due to potential uncertainty in the data and other management factors. For measured credits, grab samples will be taken during the BMP's operation to quantify the actual reductions. An inflow and outflow condition will be necessary to sample a BMP.

Current Eligible BMPs for Trading

Eligible BMPs are listed in Table 1 and in the appendix, Carter 2002. The NRCS practice code and typical lifespan are included here.

Table 1. BMPs Currently Eligible for Trading.

BMP	NRCS Code[(1)]	Lifespan
Sediment basins	350	20 years
Filter strips	393	1 season
Underground outlet	620	20 years
Straw in furrows	484	1 season

Crop sequencing	328, 329	1 season
Polyacrylamide	450	1 irrigation
Sprinkler Irrigation	442	15 years
Microirrigation	441	10 years
Tailwater Recovery	447	15 years
Surge Irrigation	430HH	15 years
Nutrient Management	590	1 year
Constructed Wetland	656	15 years

(1) Refer to http://id.nrcs.usda.gov/practices.htm
Additional components for the BMP may incorporate other practice codes.

BMP Efficiency and Uncertainty Discounts

Listed in Table 2 are the effectiveness and uncertainty discounts for the currently eligible types, field, farm, and watershed scale. The sediment basin is categorized into three types, which are due to differences in the size of treatment area and duration of flow in the basins.

Nutrient management does not have a phosphorus reduction efficiency due to numerous complexities. This practice, however, is a necessary long-term practice that will benefit water quality if applied properly. Though this practice does not have an efficiency associated with it, it is a valuable BMP for trading and will be marketable in relation to other applied BMPs. If nutrient management is applied in addition to other eligible BMPs, the uncertainty factor for those other BMPs will reduced by 50%, thereby increasing their market value.

Table 2: BMP Effectiveness and Uncertainty Discounts

BMP	**Effectiveness**	**Uncertainty**[1]
Polyacrylamide	95%	10%
Filter Strip	55%	15%
Sprinkler	100%	10%
Microirrigation	100%	2%
Tailwater Recovery	100%	5%
Mulching	90%	20%
Crop sequencing	90%	10%
Sediment Basin Field scale	80%	10%
Sediment Basin (farm scale)	75%	10%
Sediment Basin (watershed scale)	65%[4]	15%[4]
Underground Outlet	85% (65%)[2]	15% (25%)[2]
Surge Irrigation	50%	5%

Nutrient Management	NA[3]	NA[3]
Constructed Wetland (farm scale)	90%	5%
Constructed Wetland (watershed scale)	NA[4]	NA[4]

(1) This is to be subtracted from the efficiency.
(2) This BMP's effectiveness drops after 2 years.
(3) Data unavailable for efficiency estimate. If applied with other eligible BMPs, their uncertainty discounts will be reduced by 50%.
(4) Not recommended for calculated credit.

BMP Monitoring: Evaluation and Measurement Requirements

To ensure that a BMP is operating properly and actually reducing phosphorus losses, an evaluation is necessary. An evaluation will consist of at least one annual field inspection to ensure proper application and operation. Table 3 provides the minimum inspections needed for each BMP, and provides a minimal level of measurement requirements, though not applicable to all BMPs.

Some BMPs do not allow for true "inflow-outflow" comparisons utilizing flow and nutrient measurements, therefore it is not recommended for measurement. Also, a measurable BMP's inflow conditions only represent the instantaneous condition, not reflective of the 1996 baseline condition. In essence, these instantaneous measurements would provide a pretreatment load different than that of the baseline average load, misrepresenting the average 1996 loads. Therefore, measurements will only be allowed for two BMPs, the watershed-scale sediment basin and constructed wetlands.

Watershed-scale BMPs, such as the sediment basin and constructed wetlands, where they are not easily calculated, will only be measured to generate credits. The schedule for measurements will be set within the buyer-seller contracts for specific watershed-scale BMPs.

Table 3. BMP Evaluation Requirements

BMP	**Evaluation**
Sediment basin - field scale	before & middle of all irrigations
Sediment basin - farm scale	before & middle of all irrigations
Sediment basin - watershed scale	before & middle of season of use
Filter strips	before & middle of all irrigations
Underground outlet	before & middle of all irrigations
Straw in furrows	before & middle of all irrigations
Crop sequencing	before & middle of all irrigations
Polyacrylamide	evaluate 2 irrigations & review application records
Sprinkler Irrigation	evaluate 1 irrigation
Microirrigation	evaluate 1 irrigation

Trailwater Recovery	before irrigations & evaluate 1 irrigation
Surge Irrigation	evaluate 1 irrigation
Nutrient Management	evaluate records annually
Constructed wetland	before & middle of season of use

Credit Production Method

To calculate a total phosphorus credit, a reduction estimate is determined prior to the sale of the credits, utilizing BMP effectiveness data and other applicable factors.

In the case of calculated credits, specifically to a cropland field, the phosphorus losses in 1996 (TMDL baseline) must be estimated. The Surface Irrigation Soil Loss (SISL) tool is currently the most accurate and simple method available for the program area to estimate soil losses from surface irrigated croplands. SISL losses are then converted to phosphorus losses by multiplying tons soil loss by 2, which provides pounds of phosphorus. Typically, there is on average two pounds of phosphorus loss per ton of soil loss within the program area. This tool is described in USDA-NRCS Agronomy Technical Note No. 32.

There is a great amount of variability in soil and phosphorus loss from one year to the next because of crop rotations, as the SISL shows when used according to its design. This variability would cause a great deal of fluctuation from year-to-year in credits generated from one field. This fluctuation is not desired for trading. Also, because there does not exist data for all fields within the program area for 1996, the crop specific SISL estimate cannot be derived for a number of fields.

An average subwatershed Base Soil Loss (BSL), a necessary factor in SISL, has been determined for each of the major Lower Boise River subwatersheds (Table 4). Numerous field crop records from 1996 were evaluated to establish baseline 1996 soil losses with SISL. By utilizing the average subwatershed BSL, crop rotations will have no effect on credit calculation because the pretreatment load of 1996 will not change. A change in credits will only be due to switching from one BMP to another.

Where the SISL-BSL represents seasonal sediment losses, monthly losses may be estimated utilizing numerous irrigation records, which can be used to provide an average number of irrigations per month. Another critical factor to be considered in determining an average sediment and phosphorus loss on a monthly basis, is the percent soil loss of total per irrigation. The first three irrigations typically produce the majority of the annual sediment loss, whereas, with each additional irrigation, less erosion takes place due to increasing soil stability and some crop foliage protection where it lies within the furrow later in the growing season.

Table 4. SISL BSL (tons/ac/yr soil loss[1]) per Subwatershed

Slope of field	<1%		1-1.9%		2-2.9%		>3%	
Drain/Field length	660	1320	660	1320	660	1320	660	1320
Eagle Drain	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Thurman Drain[2]	NA	NA	NA	NA	NA	NA	NA	NA
Fifteenmile	1.6	1.3	5.8	4.6	12.5	10.0	21.0	16.8
Mill Slough	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Willow Creek	1.9	1.5	6.8	5.5	14.7	11.7	24.0	19.2
Mason Slough	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Mason Creek	1.7	1.4	6.4	5.1	14.1	11.2	23.7	18.9
East Hartley	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
West Hartley	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
Indian Creek	1.9	1.5	6.9	5.5	14.9	11.9	24.7	19.8
Conway Gulch	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
Dixie Drain	1.7	1.4	6.4	5.1	13.9	11.1	23.0	18.4
Boise River	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2

(1) Multiple BSL by 2 to obtain pounds of phosphorus
(2) Thurman drain currently does not have any cropland fields within it drainage area.

Based on numerous irrigation records and local input, average number of irrigations per crop type per month was established, then one average for all crops per month. The average number of irrigations per month is shown in Table 5.

Table 5. Average Number of Irrigations per month, based on a 181-day irrigation season.

Month	Irrigations	Days/month
April	0.4	15
May	1.2	31
June	2.4	30
July	3.0	31
August	1.9	30
September	0.5	31
October	0.2	15
Total	9.5	181

The average number of irrigations per month was not rounded to the whole number because it would exclude any irrigation that does occur in April and October. The irrigation season is assumed to start on start on April 15 and end October 15, providing a 181 irrigation day season.

Based on numerous runoff studies on surface irrigated cropland, percent soil loss per irrigation was determined. These percent losses per irrigation were then lined up with the average 9-10 irrigations per season to estimate average percent loss per irrigation (Figure 1).

Figure 1. Average Percent Soil Loss per Irrigation per Total Season Loss

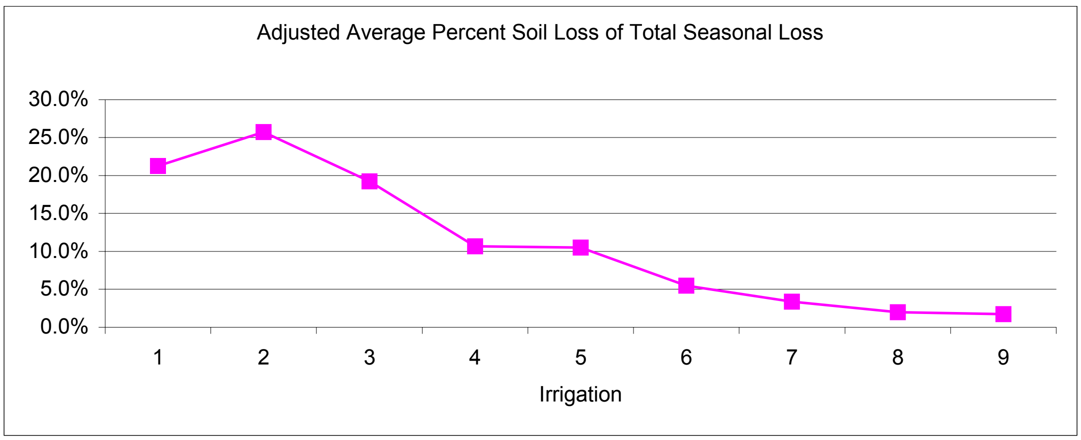

Table 6 shows the percent loss per month, which was derived from the average irrigations per month (Table 5) and percent loss per the 9-10 irrigations per season (Figure 1).

Table 6. Percent Soil Loss per Month

Month	**Percent Loss**
April	8.5%
May	28.1%
June	39.9%
July	19.4%
August	3.6%
September	0.4%
October	0.1%

Recent water quality samples taken throughout the Lower Boise River tributaries reflect similar loss characteristics, where the months of May, June, and July show the largest in-stream sediment loads. Once the seasonal SISL losses are determined, which represents the pretreatment load, a monthly estimate can be estimated with the values from Table 6.

Appendix

Carter, D.L. 2002. Proposed Best Management Practice (BMP) List and Application Criteria for the Lower Boise River. Unpublished report.

Lower Boise River Watershed
Pollutant Trading Ratios

This document provides information on the ratios used to trade phosphorus in the Lower Boise River watershed. The ratios should not be adapted to other trading markets without re-evaluation of the relationships and flow characteristics.

Hydrologic Basis for Establishing Ratios

The ratios are based upon a mass balance model that tracks the flow of water and phosphorus from Lucky Peak dam to Parma. To be consistent with the Draft Lower Boise River TMDL, the mass balance spreadsheet models the average of the 1996 irrigation season, from April 15 to October 15. In total volume, 1996 had a 71st percentile irrigation season, with high flows in the early part of the season, and more typical flows for the later part of the season. The spreadsheet includes a split around Eagle Island, and captures the differences in diversions and inputs between the north and south channels. Nearly twice as much water is diverted from the south channel, which accounts for the fact that the West Boise and Thurman Drain ratios are slightly lower than the ratios for Eagle Drain (north channel) and the Lander Street facility (effluent goes through both channels). The phosphorus loads from each source were adjusted independently to calculate ratios, which represent the amount of a change in a phosphorus load that reaches Parma. This model does not make any assumptions related to the uptake of phosphorus in the Boise River. To identify the potential for ratio fluctuation among flow years, DEQ analyzed 1996 (a 71st percentile irrigation season total flow) and 1994 (a 29th percentile irrigation season total flow). Since diversions remove a larger proportion of the total river flow during a low flow year, ratios for upstream sources are likely to decline.

River Location Ratios

The phosphorus sources within the watershed are scattered across the length of the river from Lucky Peak to the confluence with the Snake River. Since irrigation diversions remove flow from the river at many points, the entire load of phosphorus discharged by a source does not reach the mouth of the river. The location of each source is incorporated into its ratio through a mass balance model that accounts for inputs, withdrawals, and ground water. Location ratios are calculated from each source relative to Parma.

Table 1. Location Ratios for Municipalities

Source Name	RATIO
Lander Street	0.56
West Boise	0.51
Eagle Island Fish Hatchery	0.67
Meridian	0.75
Star	0.75
Middleton	0.75
Nampa Fish Hatchery*	0.20
ConAgra/Armour*	0.20
Nampa*	0.20
Caldwell	0.89
Notus	0.95

*The Armour, Nampa, and Nampa Fish Hatchery effluents are strongly influenced by the Riverside Diversion, and thus have low ratios.

Table 2. Location Ratios for Tributaries and Drains

Source Name	RATIO
Eagle Drain	0.63
Thurman Drain	0.51
Fifteenmile Creek	0.75
Mill Slough	0.75
Willow Creek	0.75
Mason Slough	0.75
Mason Creek	0.75
East Hartley Gulch (1)	0.80
West Hartley Gulch (1)	0.80
Indian Creek	0.89
Conway Gulch	0.95
Dixie Drain	0.96

(1)East & West Hartley Gulch merge before confluence at Boise River.
Those river adjacent lands that impact the river directly will receive the next downstream tributary river location ratio.

Site Location Factors

Transmission losses may occur between the point where the reduction takes place and the subwatershed's channel due to wastewater being reused and natural sediment-phosphorus relationships. Canals may intercept wastewater runoff from fields, which may or may not impact the drainage in which the field is located. The greater the travel distance and the chance of reuse, the less likely the total phosphorus amount lost at the field will reach the channel. Site Location Factors are developed to account for some of this transmission loss, shown in Table 3.

Table 3. Site Location Factors

Land runoff flows into a canal, likely to be reused by downstream canal users	0.6
Land runoff does not flow directly to a drain, but through or around other fields prior to entering a drain	0.8
Land runoff flows directly to a drain or stream through a culvert or ditch	1.0

Drainage Delivery Ratios

Drainage Delivery Ratios were also developed to account for the phosphorus transmission losses in the subwatershed's main channels. Recent water quality samples collected from within some of these subwatersheds do show however, upstream to downstream, an increase in phosphorus concentrations. This increase in phosphorus concentration is likely due to increasing surface and ground water flows and phosphorus loads from increasing numbers of sources. Due to no available research data or locally developed transmission models, a simple linear calculation is made that represents this potential loss, which is:

(100 - distance in miles to mouth of the drain from the project's point of discharge on the drain)/100.

A measurement, in miles, is made from the mouth of the channel on the river to the point where the wastewater enters the channel. This measurement is to be made with the use of computer based Geographic Information Software (GIS).

Example Credit Calculation

The following is an example of calculating credits for a nonpoint source:

Given: 30 acre surface irrigated field with a sediment basin capable of trapping 80% of the sediment. The uncertainty discount associated with this basin is 10% (subtracted from BMP efficiency). Assuming the annual SISL load calculation is 7.3 tons/acre soil loss per irrigation season, calculated to be 229 total tons diverted into the basin. Estimated phosphorus loss from the field is calculated to be 438 pounds (229 x 2 lbs/t), which is diverted into the basin. The Site Location Factor is 0.8, because of potential reuse but not through a canal. The distance from the river to the entry point at the channel is 2.5 miles, which gives a 0.975 Drainage Delivery Ratio. The River Location Ratio is 0.75.

Credits (Parma Pounds) =
438 lbs P x
0.80 trap efficiency - 0.10 uncertainty x
0.8 site location factor x
0.975 drainage delivery ratio x
0.75 river location ratio =
179 credits (Parma Pounds) for sale for irrigation season (annual).

By month:	*April*	*15.2*
	May	*50.3*
	June	*71.4*
	July	*34.7*
	August	*6.4*
	September	*0.7*
	October	*0.2*

Note: A TMDL reduction requirement will need to be met first, therefore, a percentage of these credits will not be tradable.

Equations Used in the Mass Balance Model

The mass balance model tracks the flow of water moving through the Boise River and its associated concentration of total phosphorus. The flow and the concentration are used to track the mass load of total phosphorus along the length of the river. Flow, total phosphorus concentration, and the load of total phosphorus are recalculated at each input or diversion until the endpoint of the model, Parma, is reached. Please note that “total phosphorus” is a specific type of laboratory analysis that includes both sediment attached and dissolved phosphorus.

Total Phosphorus Concentration

New total phosphorus concentration in the Boise River =

$$\frac{(\text{River Flow} * \text{River [TP]}) + (\text{Source Flow} * \text{Source [TP]}) + (\text{GroundH2O Flow} * \text{GroundH2O[TP]})}{\text{River Flow} + \text{Source Flow} + \text{GroundH2O Flow}}$$

Where:

River Flow	= flow in the Boise River, cfs
River [TP]	= concentration of total phosphorus in the river, mg/l
Source Flow	= either an input (tributary or treatment plant) or a diversion of water, cfs
Source [TP]	= concentration of total phosphorus from a treatment plant or tributary, mg/l Diversions remove water that contains the concentration of total phosphorus in the Boise River where the withdrawal occurs.
GroundH2O Flow	= flow of groundwater into the Boise River, cfs
GroundH2O [TP]	= concentration of total phosphorus in the groundwater, 0.126 mg/l in this model

Total Phosphorus Load

Total Phosphorus Load = New River flow * 5.4 * River [TP]

Where:

New River Flow	= net inputs, diversions, and groundwater flow from the previous step, cfs
River [TP]	= concentration of total phosphorus as calculated in previous step, mg/l
5.4	= units conversion factor to yield pounds per day

Upper Snake Rock Subbasin – Middle Snake River
Pollutant Trading Ratios

This document provides information on the ratios used to trade phosphorus specific to the Middle Snake River in the Upper Snake Rock Subbasin (HUC 17040212).

APPLICATION LIMITS OF RATIOS

The ratios should not be adapted to other trading markets or scenarios without re-evaluation of the relationships, flow characteristics, and overall qualifications defined for the Middle Snake River. The ratios described in this document are only applicable to the Middle Snake River for phosphorus.

HYDROLOGIC MODEL BASIS FOR ESTABLISHING RATIOS

The ratios are based upon a mass balance model that tracks the flow of water and phosphorus from Milner Dam to King Hill, Idaho. The phosphorus TMDL target of 0.075-mg/L TP is the central basis of the model. The TMDL assumes that the water quality pollutant targets by the various water user industries are implemented over a 10-year period. The target is applicable only to the Middle Snake River.

This model does not make any assumptions related to the uptake of phosphorus in the Middle Snake River. A pound in equals a pound out at any place on the river since the overall target for the whole Middle Snake River is 0.075-mg/L TP.

There are seven (7) compliance points on the Middle Snake River that relate to meeting beneficial uses and/or water quality standards as defined in the Upper Snake Rock TMDL. The compliance points include Milner Dam, Pillar Falls, Crystal Springs, Below Box Canyon, Gridley Bridge, Shoestring Bridge, and King Hill, Idaho. Because of these seven (7) compliance points, six (6) segments are defined on the Middle Snake River. The six (6) segments are Segment 1 (Milner Dam to Pillar Falls), Segment 2 (Pillar Falls to Crystal Springs), Segment 3 (Crystal Springs to Box Canyon), Segment 4 (Box Canyon to Gridley Bridge), Segment 5 (Gridley Bridge to Shoestring Bridge), and Segment 6 (Shoestring Bridge to King Hill, Idaho). Figure 1 illustrates all of the compliance points, the segments, and the major tributaries that discharge to the Middle Snake River, however, pollutant trading is only provided for on the first three segments at this time.

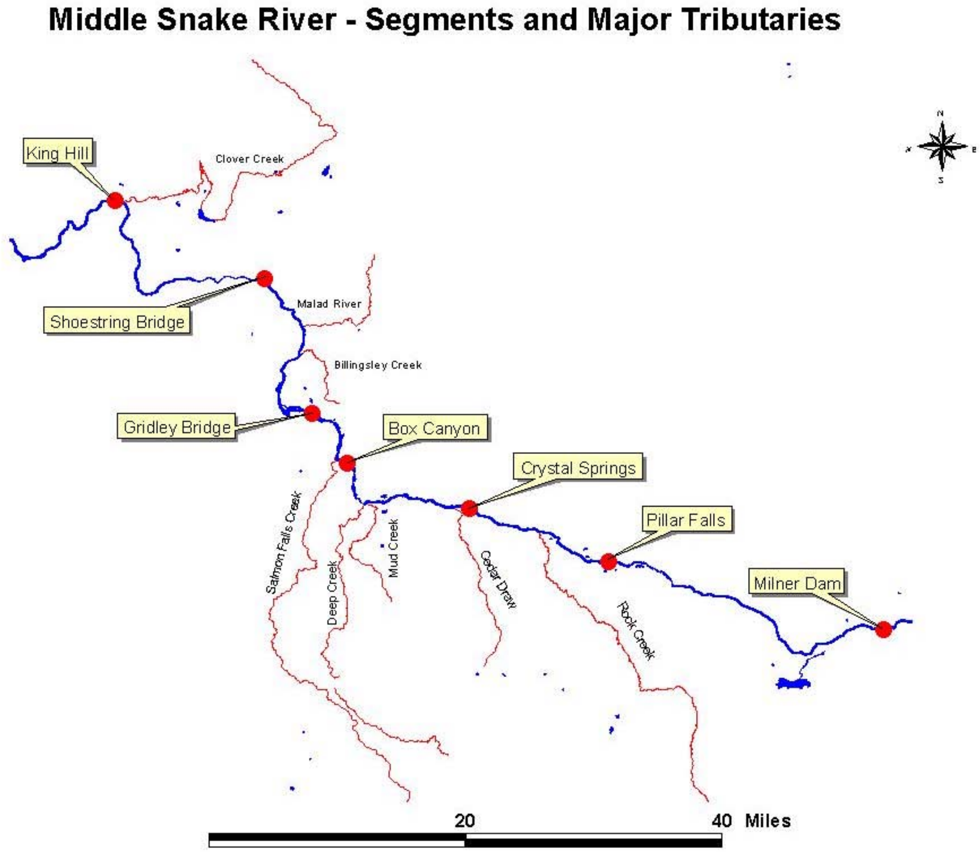

Figure 1. Middle Snake River – Segments and Major Tributaries

The mass balance model stipulates the following assumption:

Total Flow = Groundwater Flow + Point Source Flow + Nonpoint Source Flow

To the extent practical, each component of the mass balance model was subdivided into flows that could be accounted versus flows that could not be accounted. USGS quadrangle maps (1:24,000) were consulted to define more accurately which sources were unaccounted. This ended up being unnamed springs or tributaries that discharged directly into the Middle Snake River. Most unnamed tributaries are ephemeral streams.

CONCEPTUALIZATION OF MASS BALANCE MODEL

The mass balance model for the Upper Snake Rock TMDL operates under the premise that the Middle Snake River will obtain the instream target of 0.075 mg/L TP as an overall average for the river system. Seven (7) compliance points along a 94-mile stretch of river have been selected for monitoring purposes to ascertain if the concentration target is reached.

Several assumptions are included in the Mid-Snake Model. These are:

1. The Mid-Snake Model incorporates all known inputs and diversions. In the case of the Middle Snake River, the mass balance centers primarily on inputs since the majority effects come from inputs and very minimally from outputs (or diversions). No diversions occur in Segments 1, 2, and 3.

2. The upstream portion of the Mid-Snake Model begins at Milner Dam (River Mile 638.5). Although the model runs all the way to King Hill, Idaho (River Mile 545.0), pollutant trading is allowed in only the first three (3) segments of the Middle Snake River. Therefore, the furthest downstream site is below Box Canyon (River Mile 587.0).

3. The flow information was derived for the years 1983 through 1998. These years were chosen because they aptly describe the more recent flow conditions on the Middle Snake River. The baseline years are defined as 1990-1991. High flow years are defined for eight (8) years: 1983-1987 and 1996-1998. Low flow years are defined for eight (8) years: 1988-1995. The median flow is based on flows from 1995 and 1987, whereas the mean flow is from 1983 to 1998.

4. The TP methodology is EPA 365.2 at an MDL of 0.005 mg/L or SM4500-P as unfiltered TP. TP = Suspended TP + Dissolved TP.

RIVER LOCATION RATIOS

The main phosphorus sources within the watershed, aquaculture fish hatcheries, municipalities, food processors, industrials, confined animal feeding operations, irrigated agriculture, and grazing, eventually discharge to the Middle Snake River directly or indirectly. There are no diversions from Milner Dam to Gridley Bridge. Along this stretch of the Middle Snake River, exist numerous discharges to the river. These discharges are from point and nonpoint sources. Segment 1 of the Middle Snake River runs from Milner to Pillar Falls. It is described in Table 1.

Table 1. Segment 1 – Milner Dam to Pillar Falls

River Mile	Discharge Source	Diversion Point	TP Ratios
638.5	**MILNER DAM**		1.00
630.6	Dry Creek		1.00
627.6	Northside A Drain		1.00
619.5	Southside A10 Drain		1.00
619.0	Northside C55 Drain		1.00
618.0	Southside Twin Falls Coulee		1.00
617.9	Vinyard Creek		1.00
613.1	**PILLAR FALLS**		1.00
Springs are not identified in this table. However, 57 springs are identified as discharging directly to the Middle Snake River. It is uncertain how many additional unnamed springs exist. Unnamed surface waters are not included.			

Segment 2 of the Middle Snake River runs from Pillar Falls to Crystal Springs. It is described in Table 2.

Table 2. Segment 2 – Pillar Falls to Crystal Springs

River Mile	Discharge Source	Diversion Point	TP Ratios
613.1	**PILLAR FALLS**		1.00
612.7	East Perrine Coulee		1.00
610.9	Main Perrine Coulee		1.00
610.1	Canyon Springs Fish Hatchery		1.00
610.0	Alpheus Creek		1.00
609.9	Blue Lakes Fish Hatchery		1.00
609.1	Southside West Perrine Coulee		1.00
608.9	Pristine Springs Fish Hatchery		1.00
608.5	City of Twin Falls Municipality		1.00
608.3	Southside 43 Drainage		1.00
608.0	Warm Springs Creek		1.00
607.5	Jerome Golf Course Drain		1.00
607.2	Auger Falls		1.00
606.4	Rock Creek		1.00
605.3	Southside 30 Drain		1.00
603.4	Southside LS/LQ Drain		1.00
602.2	Southside LS2/39A Drain		1.00
600.9	Northside N42 Drain		1.00
600.9	Southside 39 Drain		1.00
600.5	Crystal Springs Fish Hatchery		1.00
600.4	**CRYSTAL SPRINGS**		1.00
Springs are not identified in this table. However, 74 springs are identified as discharging directly to the Middle Snake River. It is uncertain how many additional unnamed springs exist. Unnamed surface waters are not included.			

Segment 3 of the Middle Snake River runs from Crystal Springs to Below Box Canyon Area. It is described in Table 3.

Table 3. Segment 3 – Crystal Springs to Lower Box Canyon

River Mile	Discharge Source	Diversion Point	TP Ratios
600.4	**CRYSTAL SPRINGS**		1.00
600.0	Magic Valley Fish Hatchery		1.00
599.1	Cedar Draw		1.00
599.0	Niagara Springs Fish Hatchery		1.00
598.7	Rim View Fish Hatchery		1.00
598.1	Southside I Drain		1.00
595.0	Northside J8 Drain		1.00
598.0	Clear Springs and Lake: Snake River Fish Hatchery Clear Springs Processing Middle Fish Hatchery Clear Lakes Fish Hatchery		1.00
592.5	Gary Wright Fish Hatchery		1.00
591.8	Kanaka Rapids		1.00
591.5	Southside N Drain		1.00
591.5	Catfish Fish Hatchery		1.00
591.5	Mud Creek		1.00
591.4	Deep Creek		1.00
590.3	Briggs Creek Fish Hatchery		1.00
589.5	Northside S29 Drain		1.00
589.8	Kaster Trout Fish Hatchery		1.00
588.4	Northside S19/S Drains		1.00
588.4	Box Canyon Fish Hatchery		1.00
588.1	Blind Canyon Creek		1.00
588.1	Blind Canyon Fish Hatchery		1.00
587.8	Box Canyon “Creek”		1.00
587.0	**BELOW BOX CANYON AREA**		1.00
Springs are not identified in this table. However, 66 springs are identified as discharging directly to the Middle Snake River. It is uncertain how many additional unnamed springs exist. Under the Mid-Snake TMDL (1997) and the Upper Snake Rock TMDL (1999), the Clear Springs and Lake is considered a part of the Middle Snake River. It is another groundwater source that discharges directly to the river. Unnamed surface waters are not included.			

EQUATIONS USED IN THE MASS BALANCE MODEL

The standard equation used in the mass balance model is the same one used for calculating loads.

$$\text{Load, lb/day} = \text{Concentration, mg/L} \times \text{Flow, cfs} \times 5.4$$